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HASSAYAMPA BRIDGE
SPANNING HASSAYAMPA RIVER AT OLD U.S. HIGHWAY 80
ARLINGTON VICINITY
MARICOPA COUNTY
ARIZONA

HAER No. AZ-36

PHOTOGRAPHS
HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
WESTERN REGIONAL OFFICE
DEPARTMENT OF THE INTERIOR
450 GOLDEN GATE AVENUE
P.O. BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

● Historic American Engineering Record

HAER No. AZ-36

Hassayampa Bridge

Location: Spanning the Hassayampa River on old U.S. Highway 80 at Hassayampa, in Arlington vicinity; Northwest $\frac{1}{4}$ of Section 13, Township 1 South, Range 5 West; Maricopa County, Arizona.

UTM: 12.339820.3691040

USGS Quadrangle: Hassayampa, Arizona (7 $\frac{1}{2}$ Minute Series, 1958)

Construction Date: 1929

Designer: Arizona Highway Department

Builder: Strong and Grant, Springville, Utah

Present Owner: Maricopa County, Arizona

Present Use: Two-lane highway bridge (scheduled for demolition in 1993)

Significance: Through its various permutations, the Hassayampa Bridge exemplifies early Arizona bridge construction. First built in 1915-16 as a temporary timber trestle, it was upgraded in 1922 by the addition of two steel trusses, and later replaced entirely with the present concrete structure. The Hassayampa Bridge is significant as an integral part of U.S. Highway 80, arguably the state's most important east-west route. The bridge's completion in 1929 eliminated the last major obstacle to foul-weather driving on the route through Arizona. The bridge is illustrative for its use of the four-rib concrete deck girder - a standard structural type in Arizona in the 1920s and 1930s. With its seven 45-foot girder spans, the Hassayampa Bridge represents one of the more noteworthy examples of its type in the state.

Assembled by: Clayton B. Fraser
Fraserdesign
Loveland Colorado

July 1993

The Historic American Engineering Record [HAER] documentation for the Hassayampa Bridge was conducted by Fraserdesign of Loveland, Colorado, under contract with the Maricopa County Department of Transportation. MCDOT has proposed the replacement of the structure, and this recordation is intended to mitigate, in part, the impact on the bridge by this action. Field recording of the Hassayampa Bridge was undertaken in May 1993. The research for this project has involved five primary archival sources: the Arizona Department of Transportation, the Phoenix Public Library, Arizona State Library, Maricopa County Department of Transportation and the Maricopa County Courthouse, all located in Phoenix.¹

From 1848, when much of Arizona territory was acquired from Mexico by the Treaty of Guadalupe, until 1863, with the enactment of the Federal Organic Act that designated the Territory after its separation from New Mexico, Arizona was crossed by only two major overland routes. Both traversed the region from east to west. The northern route followed Army Lieutenant Edward Beale's 1857 survey along the 35th parallel. Known as Beale's Road, it was used almost entirely by hunters and trappers and the military traveling to California. The southern route was constructed by the famed Mormon Brigade during the war with Mexico in 1856. Extending from Santa Fe to San Diego, this hurriedly built road entered Arizona territory in the southeast corner, extended north to the Gila River and then west to the Yuma Crossing of the Colorado River. Called the Gila Trail because it largely paralleled the Gila River, the road was later made popular by those rushing to California in search of gold. Other secondary routes - no more than trails, really - developed through the region by intermittent use. But it was these two main lines that carried most of the traffic through Arizona in the region's earliest years.

At the point where the Gila Trail crossed the Colorado River, John Gallatin built a toll ferry in 1849, supplanting earlier Indian-operated ferries. Louis Jaeger started his own ferry service here a year later, after the Indians exacted their own toll on Gallatin by scalping him. A small settlement called Jaegerville soon developed on the California side of the ferry; in December 1850 the U.S. Army established a modest encampment, called Fort Yuma, a mile upriver. The town of Colorado City was platted on the Arizona side of the river four years later.² This community changed names three times in its formative years - to Arizona, Yuma and Arizona City, successively - before its incorporation in 1871 as Yuma. In addition to its role as a port for riverboats that plied the Colorado River, Yuma served as a funnel for overland travelers between southern California and the

East. Thousands of immigrants traveled westward on foot, wagons or horseback across the Gila Trail, and the Butterfield Overland Stage followed the trail through Yuma on its route between St. Louis and San Francisco. The arrival of the Southern Pacific Railroad to Yuma in 1877 further bolstered the small city's role as a Southwestern transportation nexus.³

Meanwhile, in the Salt River Valley some 180 miles east, another colony was growing around an agriculturally based economy. The origins of Anglo settlement along the Salt River in central Arizona date from 1867. That year William John "Jack" Swilling, flamboyant Confederate army officer, prospector, Indian fighter and entrepreneur, formed the Swilling Irrigation Canal Company with John Y.T. "Yours Truly" Smith, the post sutler at Fort McDowell. They opened the Swilling Ditch by clearing an ancient Hohokam Indian canal, supplying water to a growing number of farms that sprang up along the ditch's length.⁴ Three years after the inception of the Swilling Ditch, the townsite of Phoenix was platted. Phoenix grew steadily with the rest of the Central Valley through the 1870s and 1880s.⁵ The city's future as Arizona's central metropolis was guaranteed when in 1889 the Arizona Territorial Capital was moved to Phoenix from Prescott. Although not directly on the Gila Trail, Phoenix was close enough to connect with it by a relatively short wagon road to the south. The Gila Trail thus served to link Phoenix with Yuma and points west, and eventually the northern swing through Phoenix became the main line through common use.

Whether located in Prescott or Phoenix, the Territorial Legislature during this period made only minimal impact on overland transportation in Arizona, other than to grant charters to private toll road companies and enact laws passing the responsibility for road construction to the counties. Neither the territory nor the counties had much money, though. As a result, road building in the 19th century was largely undertaken by toll road operators or by the counties on an as-needed, emergency basis. To fund road construction, the Territorial Assembly issued bonds totalling \$70,000 between 1871 and 1881, and \$15,000 in 1885. In 1905 the legislators appropriated funds for the first territorial bridge construction. But other than these tentative steps, the territorial government contributed little to road construction. Indeed, no territorial organization or staff had even been established to administer roads and bridges.

After the turn of the century, it had become apparent that many major road projects were beyond the capacity of the individual counties. Further, the counties were building roads on an individual basis, without regard to the roads in adjacent counties. This tended to create an uneven patchwork of dissimilar routes, making travel difficult for all but a few destinations. To take a more active role

in the development of intrastate highways, the Territorial Assembly in 1909 created the office of the Territorial Engineer. J.B. Girand, Arizona's first (and only) Territorial Engineer, soon thereafter began construction of several territorial highways. The strategy was to link the county seats and more populous towns through a network of graded, but unpaved, roads, which would vary in width from 16 feet to 24 feet, according to traffic and terrain.⁶

By the time Arizona was admitted to the Union in 1912, the territorial government had constructed some 243 miles of highway at an average cost of \$2,500 per mile. Additionally, 1,812 lineal feet of bridges over 100 feet in length had been built, totalling \$144,000 in value.⁷ Girand estimated that an additional 740 miles of trails and county roads would soon be upgraded to form highways,

"completing the great east and west and north and south roads."⁸ The north-south highway extended from Douglas, in the state's southeast corner, north through Tucson, Phoenix and Flagstaff, terminating at the south rim of the Grand Canyon [See Figure 1]. The east-west road paralleled the Gila River east from Yuma, as had the Gila Trail, but now it followed the river's north side and branched north to Phoenix and Mesa. East from Mesa the road followed the Apache Trail to Roosevelt Dam and wound through the mountains to Globe, looping southward to Duncan, at the state's eastern border. "The routes selected had become fixed to a certain extent by the construction of several units of their length," stated Lamar Cobb, Arizona's first State Engineer, "and, though not meeting with entire approval, they had also become fixed in the public mind as the State Highways. It was, therefore thought best not to make any changes in their location as it would undoubtedly lead to others by succeeding administrations, resulting in State Highways 'that would start nowhere and end nowhere,' thus defeating one object of the State Road appropriation - a State system of roads comprised of coordinating county units connecting every county seat in the State."⁹

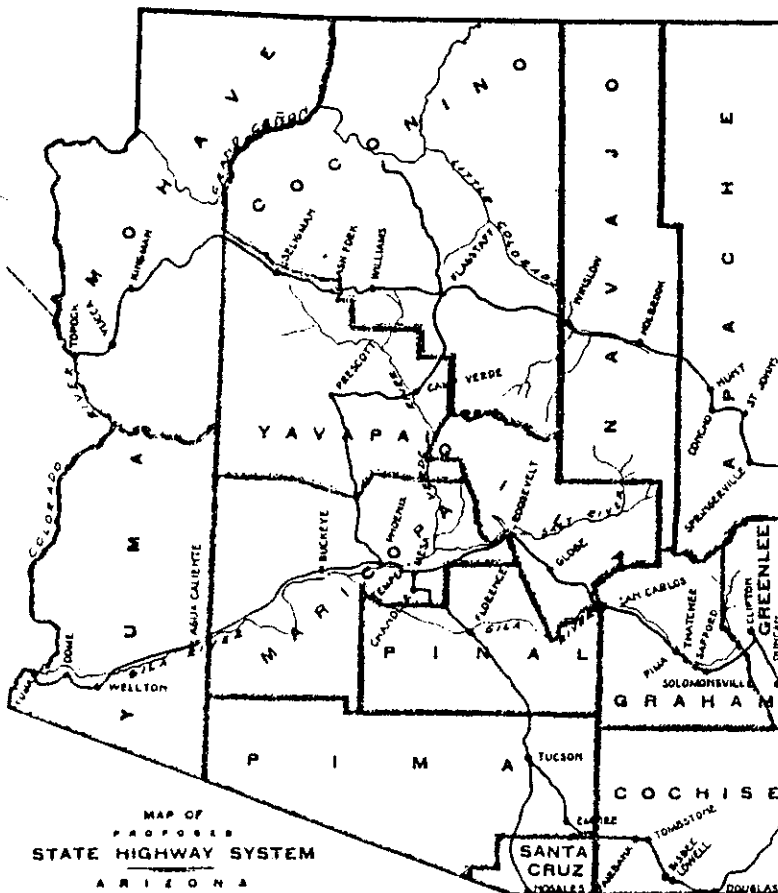


Figure 1. Map of Arizona, by Arizona State Engineer's Office, 1914

Despite this progress, Arizona roads were in dismal condition under the county road system. In 1914 Cobb reported to the state legislature:

I have been over a great many roads in every county in the state except two, and I have not found a foot of properly graded and protected mountain road or road in a rolling country that was not constructed under the direction of the [territorial] engineer department. There are a few miles of graveled road in Grohom, about ½ mile in Yuma and several miles of caliche road in Moricopa. I know of no other improved roads in the state, outside of the cities, towns or special road districts, though I may have missed a half mile or so elsewhere. Every two years the personnel of the various boards of supervisors is almost completely changed. They go in imbued with the idea that their predecessors squandered the county road funds and go out with the public equally confident that they have. With both more or less correct in their opinions, but it has not been the fault of the supervisors. With county road funds of limited proportions to repair hundreds of miles of road, and with every man in the county clamoring for work in his locality, it has been next to impossible for them to set aside a sum, in any amount, for permanent work.¹⁰

Arizona was slow to embrace the automobile in the 1910s, largely due to the poor condition of its roads. Even the major routes were little more than wagon tracks in places, troubled by steep, rocky grades in the mountains and shifting sand in the deserts. In its appropriations for road and bridge construction, the state legislature was responding not only to requests from its Arizona constituency but to pressure from out of state as well. The Petrified Forest near Holbrook was designated a national monument in 1906. Grand Canyon National Park was established in 1919, rapidly becoming one of the country's premier scenic attractions. These and a profusion of other sites drew tourists from all directions. As more sightseers were taking to the Western roads in cars or motor coaches, the need for better roads became more urgent.

Added to this was the movement in the 1910s for transcontinental highways. Two such transcontinental roads were routed through Arizona in the 1910s. The Old Trails Highway followed the Atchison, Topeka and Santa Fe Railroad - which itself generally followed Beale's Road - over the width of the state. Later incorporated into Route 66 between Chicago and Los Angeles, this highway formed the major east-west route across northern Arizona. Despite its importance, the route was "just dirt all through Arizona," according to Valentine, Arizona, resident Robert Goldstein. "A [fifty mile] trip to Kingman might take two days if the washes was running."¹¹

Similarly, the old Gila Trail was incorporated into the Ocean-to-Ocean Highway, which later became U.S. Highway 80 in Arizona. This route, portions of which

were the most heavily trafficked in the state, touched Douglas, Benson, Florence, Phoenix and Yuma on its way across southern Arizona. Towns along the route that had been established to serve the Southern Pacific Railroad eventually transformed themselves into highway towns, sprouting motor courts, diners and service stations to ply the car-borne trade. Dome, Wellton, Agua Caliente and Buckeye straddled the road between Yuma and Phoenix. As did the small crossroads settlement of Hassayampa, located just east of Buckeye. Named after the Hassayampa River, which at that point drained into the lower Gila region, Hassayampa developed around a garage operated by Osie Bates.¹² It, too, benefited from the auto traffic along the highway.

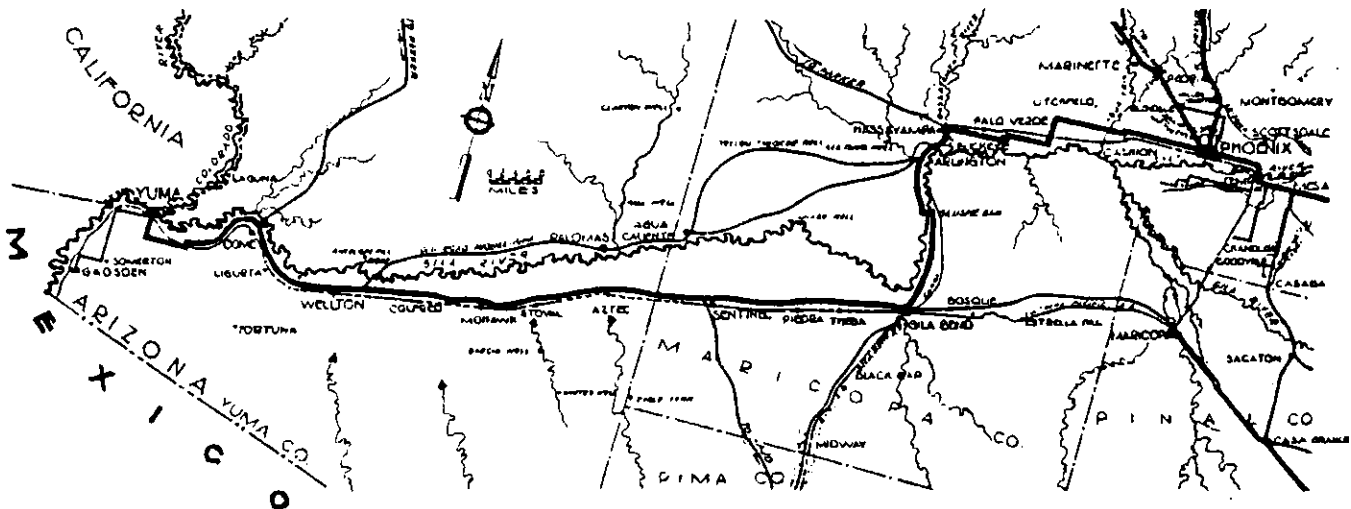
The Ocean-to-Ocean Highway suffered from the same poor maintenance as the Old Trails Route. Upkeep of the road from Phoenix to Yuma had been shared by Maricopa and Yuma counties over the years, with predictably uneven results. In 1914-15 the state undertook some repairs of the highway in Yuma County and - more significantly - built a major bridge over the Gila River east of Wellton. Comprised of fifteen 65-foot concrete deck girder spans, the Antelope Hill Bridge was one of the largest highway bridges undertaken to date by the State of Arizona.¹³ At the same time, the Office of Indian Affairs erected a long-span steel truss that carried the highway over the Colorado River at Yuma.¹⁴

Up to this point the state had undertaken no improvements on the eastern end of the Phoenix-Yuma Highway, as this segment of the route had become known. In 1914, the Arizona Highway Department [AHD] commenced work on the section between Arlington and Agua Caliente "on account of this section being the worst part of the road."¹⁵ Highway department engineers were faced with a choice of courses to take: the southern route through Woolsey Park and Point of Rocks (which was then in common use), or the northern route by way of the Fourth of July Butte and Yellow Medicine Wash. As reported by Lamar Cobb:

It was found that both routes presented many difficulties and disadvantages. The southern route would have required a great deal of heavy rock work to get through Woolsey Wash and past the Point of Rocks. It also ran for many miles through the silt bottom land of Cottonwood Wash and the Gila River - the poorest kind of material for road purposes - and the outlook for obtaining anything better for surfacing was very discouraging, as there was nothing suitable that would give a shorter average haul than about ten miles. There were also many large and unconfined washes to cross. The northern route ran through a somewhat rougher country and was a few miles longer, but the material was, in the main, of a suitable character for surfacing, and there was a great deal less drainage to be looked after. For these reasons it was decided upon as being the one that would prove most economic eventually.¹⁶

Both courses followed the north side of the Gila, thus avoiding the need to build a costly bridge over the river. The highway department maintained the northern

route over the following years, building a multiple-span concrete girder bridge over the Agua Fria River at Coldwater in 1915-16 and a timber pile bridge over the Hassayampa River at the town of Hassayampa.¹⁷ But it became increasingly evident that the better route to take would be south of the Gila River, along the original Gila Trail. It was "demonstrated beyond question that [the northern] location was not feasible" in the wake of floods on the Gila in 1919 and 1920, which washed out a large part of the highway between Wellton and Agua Caliente.¹⁸ Moreover, the Antelope Hill Bridge had become an embarrassment to the department, washing out with almost every major flood along the river. By 1920 the highway department had decided to re-route the highway, if a suitable crossing over the Gila could be secured [see Figure 2].¹⁹



■ Figure 2. Map of Phoenix-Yuma Highway, by Arizona Highway Department, 1920

The solution came from an unlikely source, in the form of a dam across the Gila, built in 1920-21 by Frank Gillespie. A native of Oklahoma, Gillespie dammed the Gila River south of Buckeye to irrigate his extensive agricultural holdings.²⁰ Unlike the two preceding diversion dams at this point, Gillespie's dam was a substantial structure, comprised of a long series of concrete arches and an extensive concrete apron on its downstream side. Soon after the dam's completion, the highway department secured the right-of-way to allow vehicles to drive across the downstream apron. When water spilling over the dam became too turbulent for cars to negotiate, the highway department chained them to a tractor and pulled long strings of vehicles across the dam in an extended train. The dam crossing was intended as a temporary measure and was replaced in 1927 by a permanent bridge, but it provided the pivotal crossing of the Gila that allowed the highway department to reroute the Phoenix-Yuma Highway south of the river.²¹

The 1920s were a decade of incremental improvements on the Phoenix-Yuma Highway. AHD divided the route into relatively short segments, denoted them federal aid projects, and graded or paved the road in successive segments on either end. By 1926, the route had been designated U.S. Highway 80, part of the so-called "Broadway of America". Graveled over most of its length, the highway was paved between Phoenix and Hassayampa, which had at the time "several stores and garages, and rooming houses where the tourist may spend the night."²²

The highway construction was relatively straightforward. It was the bridges that proved to be the Achilles heel of the highway department, as they had since territorial times. Despite its continued efforts, the highway department was unable to keep the major spans on the Phoenix-Yuma Highway - or those elsewhere in the state - serviceable. "At present there is not a single main route through our State which is not subject to traffic tie-ups at one or more major stream crossings," stated AHD Bridge Engineer Ralph Hoffman in 1927. "Such conditions are distasteful to through tourists and they will seek other routes on which they are not liable to be delayed by washouts. Our State is widely known for its good roads and millions of dollars are spent within our boundaries annually by tourists who travel these roads. Why not make them all-weather roads by building good substantial bridges?"²³

The Colorado River Bridge at Yuma had been difficult to erect, but it had withstood several subsequent floods without serious damage. The Antelope Hill Bridge, on the other hand, was a disaster from the start. Ceremoniously opened to traffic in August 1915 after several construction delays, this star-crossed structure began to fail almost immediately. In January 1916 floods washed away almost two miles of approach grading and enlarged the river's channel at the north end of the bridge by approximately 300 feet. To correct this, the state legislature in March 1917 appropriated \$50,000 to build an extension on the north end. Completed in the autumn of 1918, the bridge carried traffic until a flood a week after Thanksgiving, 1919, again destroyed the north approach and shifted some of the concrete piers on the extension.

Further flooding three months later dropped about 300 more feet of trestle, the north abutment and the northernmost girder. Worse, the flood caused several of the piers on the extension, already damaged by the previous flood, to sink further and shift downstream. "The Antelope Hill Bridge is located at a point where it is impossible to control the river and keep it under the bridge at any reasonable cost," complained State Bridge Engineer Merrill Butler in 1921. "Foundation conditions are bad and a permanent extension would necessarily be long and costly with the strong possibility that the same situation would again develop in a few years." Butler concluded, "The foregoing, together with the

apparent need for extensive repairs to two of the existing piers, should mitigate against anything except some form of temporary construction."²⁴ Within two years, the highway department had bypassed the bridge entirely.

Actually, the Antelope Hill Bridge suffered from at least three major structural flaws, which combined to make it a maintenance nightmare. First, the bridge was poorly situated on a sweep of the river that was prone to extensive flooding. Second, the piers were poorly founded on spread footings and provided with insufficient scour protection. The Gila was notorious for the deep alluvial deposits in its bed, reaching as deep as 135 feet in some locations.²⁵ Finally, without shore rectification works to constrict and guide the river, the Gila was allowed to shift channels unchecked, putting unbearable pressure on the bridge's north spans and approaches. These problems could have been addressed during initial construction. Engineers had learned to cope with similar problems of far greater magnitude on the Missouri River forty years earlier. But the deceptively placid nature of the Gila River at normal stage did not prepare the engineers for its radical character change in flood.

Only slightly less troublesome was the bridge over the Agua Fria River at Coldwater. In 1915 the Arizona State Engineer designed the bridge with 37 concrete girder spans, supported by concrete column bents. Construction began in December. Three months later, heavy flooding forged a new channel on the opposite side of an island about 1,000 feet upriver from the bridge site. Rather than redesign the bridge to accommodate the shift in channel, the engineers continued building it as drawn, only now over a dry streambed, and attempted to re-divert the river back into its earlier bed by filling the new channel.

When the bridge's west approach washed out the first winter, the state legislature appropriated \$20,000 for reconstruction and channel work. The newly rebuilt structure lasted until the Thanksgiving flood of 1919, when seven spans and both approaches collapsed into the river. Subsequent floods carried away five additional spans. As AHD tried to keep up with the repairs, the approaches washed away with every flood. "The location and foundation conditions are both extraordinarily poor," stated Butler, "but the bridge is on a main highway, a road of great economic importance, and in a section where no better site can be found within a reasonable distance."²⁶ Like the Antelope Hill Bridge, the Coldwater Bridge was eventually abandoned by the highway department as unsalvageable.

With the completion of the multiple-truss Gillespie Dam Bridge in 1927, the only other problematic crossing on the route was the bridge over the Hassayampa River at Hassayampa. Originally built as a temporary structure in 1915-16, the bridge here originally consisted of a series of timber piles. In 1922 AHD added two 90-foot pony trusses onto the east end of the existing bridge, but the wooden trestle posed continued maintenance problems. Finally, the highway department engineers gave up on salvaging it, too. In 1927, after yet another washout, AHD engineers began planning a replacement structure for the Hassayampa Bridge.

As delineated by the highway department in 1928, the new bridge would follow the same alignment as the structure it replaced [see *Figure 3*]. The crossing was located about a tenth of a mile east of the small town, oriented on an east-west axis at a slight skew over the river's channel. The new Hassayampa Bridge was comprised of seven concrete deck girders, supported by solid concrete piers on spread footings. In an effort to economize on the substructural costs, AHD used the two original concrete piers and one abutment from the 1922 trusses [see *Figure 4*]. This dictated the span length of the girders as one-half the span of the trusses, or 45 feet, 8 inches. The overall length of the bridge was almost 320 feet; the roadway width, 24.2 feet.

The new concrete piers were configured identically to the existing, with two battered square columns joined by a solid diaphragm to form a modified dumbbell cross-section. Each pier tapered slightly from a top width of 23 feet to 24 feet 9 inches at the bottom. Five-foot-deep spread footings supported the piers.

[See *Figures 5-7* for construction drawings.] Each cast-in-place span featured four concrete girders, reinforced and formed integrally with the deck and curbs. The girders were 1 foot 5 inches wide and 3 feet 7 inches deep, with a slight angled deepening at the haunches. Each girder bore directly on the pier on its fixed end and on a 7-inch steel roller on its movable end. The four-rib girder design was a standard AHD configuration, used for variously scaled bridges across the state in the 1920s and 1930s.²⁷

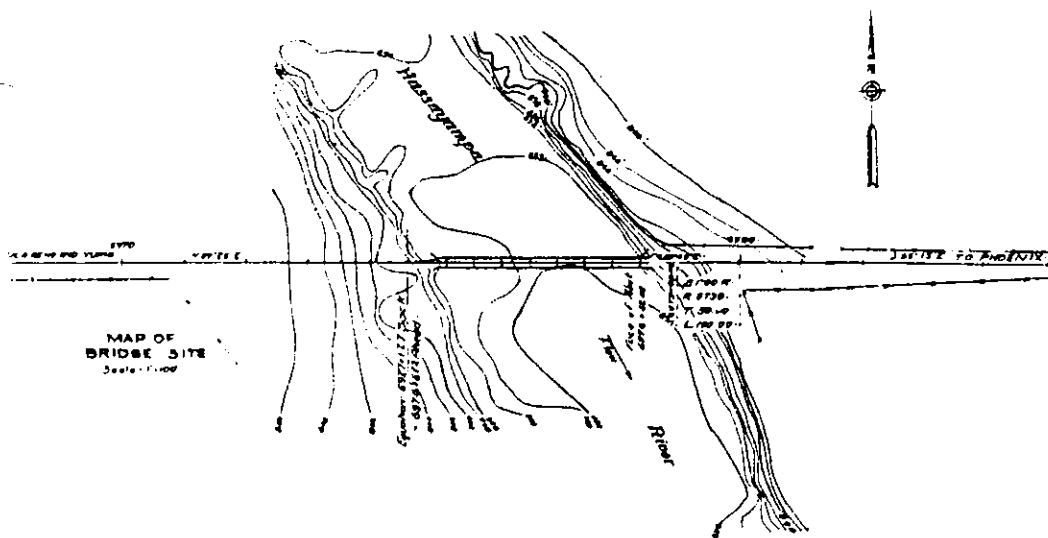
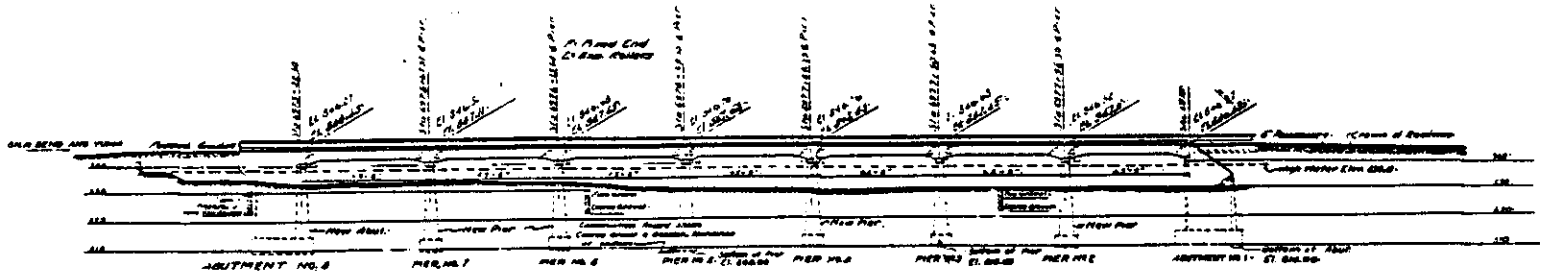


Figure 3. Site Plan of Hassayampa Bridge, by Arizona Highway Department, 1928

The visual effect of the new Hassayampa Bridge was one of straight-angled simplicity. The plainly detailed piers and relatively shallow girders provided little sense of the bridge's structural capacity and were, indeed, not visible to vehicles crossing over the bridge. The slotted concrete guardrails - another AHD standard detail - provided the structure's only architectural expression. Although comprised of more spans than most concrete girder spans undertaken by AHD at the time, the bridge was modestly sized, consuming slightly under 1,200 cubic yards of concrete and 145,000 pounds of reinforcing steel.



■ Figure 4. Profile of the new Hassayampa Bridge by Arizona Highway Department, 1928

The highway department combined \$12,000 in state funds with \$18,000 in federal funds, designating construction of the new Hassayampa Bridge Federal Aid Project 71 - Reopened.²⁸ The department solicited competitive proposals for the project in October 1928 and opened the bids on November 26. Four firms proposed to build the bridge: R.H. Martin of Tucson, the Levy Construction Company of Denver, the Wickes Engineering and Construction Company of Des Moines, and Strong and Grant of Springville, Utah. Low bidder at \$47,325.48, Strong and Grant was awarded the contract.²⁹ The contractors were slow in starting, only beginning the work in February 1929.³⁰ By April the bridge was 30% complete, 80% by the first of June. On June 30, 1929 - the contract deadline - Strong and Grant completed the bridge at a total cost of \$43,023.17. The new Hassayampa Bridge was quietly put into service at that time.

Completion of the Hassayampa Bridge marked the elimination of the last major stumbling block on the Phoenix-Yuma Highway. It was not until it and the Coldwater Bridge were replaced in the late 1920s that the route could honestly be called an all-weather highway. Route 80 functioned as the main line between the two cities through the 1950s, carrying the greatest traffic load of any highway in the state. Eventually it was superseded by Interstate Highway 10, and the part of the route that included Hassayampa was turned over by the Arizona Highway Department to Maricopa County in October 1956.³¹ The route was later re-admitted into the primary system when construction temporarily closed the interstate, but in September 1976 the Hassayampa Bridge was permanently abandoned to the county, for use as a county structure.³² During its 64 years of service, the bridge has carried heavy interstate traffic, with the partial replacement of one guardrail the only alteration of note. The Maricopa County Department of Transportation has proposed the replacement of the Hassayampa Bridge. Construction is underway on the new structure; the historic concrete span will be demolished in 1993.

The development of the Phoenix-Yuma Highway was, from the start, characterized by extensive re-routings, wildly uneven maintenance and repeated bridge failures, because its planning, construction and maintenance had been dictated by expediency. In this, it is emblematic of early road and bridge construction throughout Arizona. Chronically short of funds, the governments of the counties, Arizona Territory and the State of Arizona have historically been forced to defer long-term planning for immediate construction and repair. Nowhere was this more apparent than at the state's major bridges. The early engineers avoided building bridges when they could, and when they could not, they often eschewed permanency for low initial construction costs. In a 1927 *Arizona Highways* article notable for its apologetic tone, AHD Bridge Engineer Ralph Hoffman explained the recent failures of the Coldwater and Hassayampa bridges and others:

The fault [for bridge failures] cannot be laid at the door of the engineer, although he is not infallible, he can only go as far as the funds provided will permit. The State spends millions to build surfaced roads making them passable in all kinds of weather and leaves an unprotected gap here and there for the reason that the engineer is trying to make his money cover as much mileage as possible.³³

Through its various permutations, the Hassayampa Bridge exemplifies early Arizona bridge construction. Built originally as a stopgap measure, it carried traffic long after its status as a temporary structure had lapsed. The later steel trusses prolonged the bridge's utility, but the structure was still prey to washouts. Finally, when state highway engineers were prompted to replace the original bridge entirely, they used a standard concrete design, at last building a structure that could be considered permanent.

The Hassayampa Bridge is significant as an integral part of U.S. Highway 80, arguably the state's most important east-west route. The bridge's completion in 1929 eliminated the last major obstacle to foul-weather driving on the route through Arizona. The bridge is illustrative for its use of the concrete girder - a standard structural type in Arizona in the 1910s and 1920s. With its seven 45-foot girder spans, the Hassayampa Bridge represents one of the more noteworthy examples of its type. Though not as dramatic in its configuration as the Navajo Bridge, built over the Grand Canyon at the same time, or as spectacular in its failures as the Antelope Hill Bridge or the Coldwater Bridge, the Hassayampa Bridge is an important early Arizona transportation-related resource.

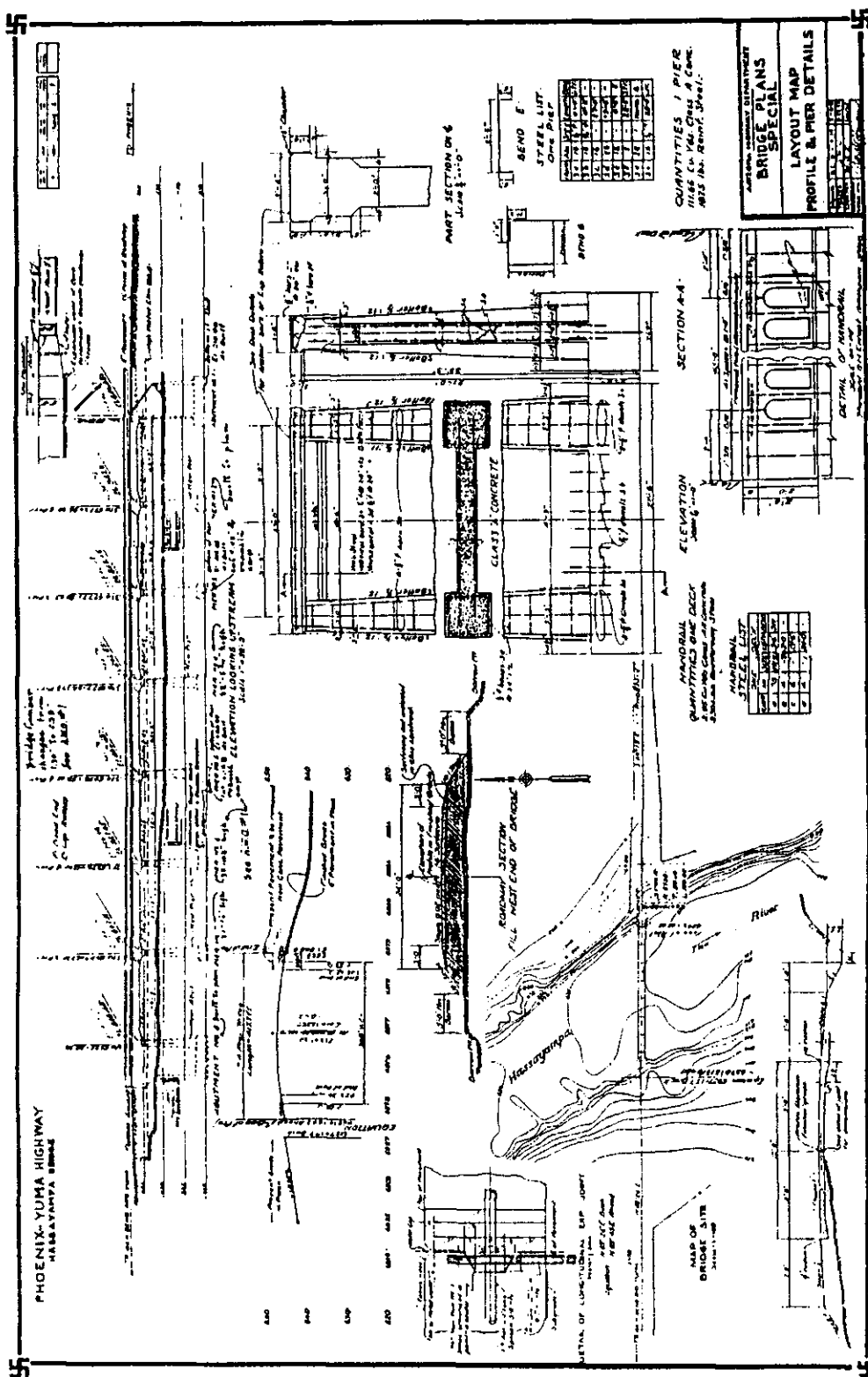


Figure 5. Layout Map, Profile and Pier Details of the Hassayampa Bridge, by Arizona Highway Department, 1928

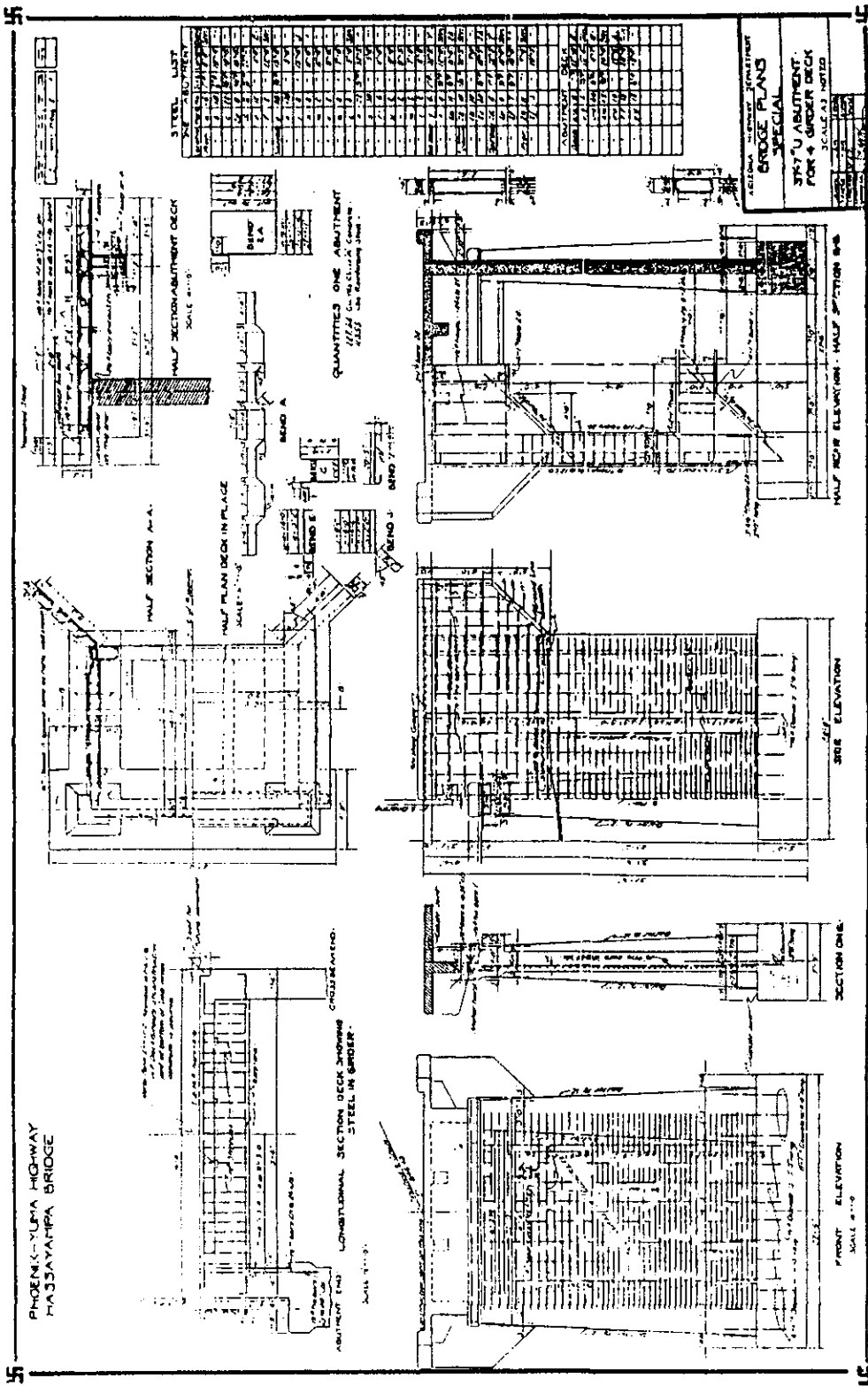


Figure 6. 17' U Abutment for 4 Girder Deck of the Hassayampa Bridge, by Arizona Highway Department, 1928

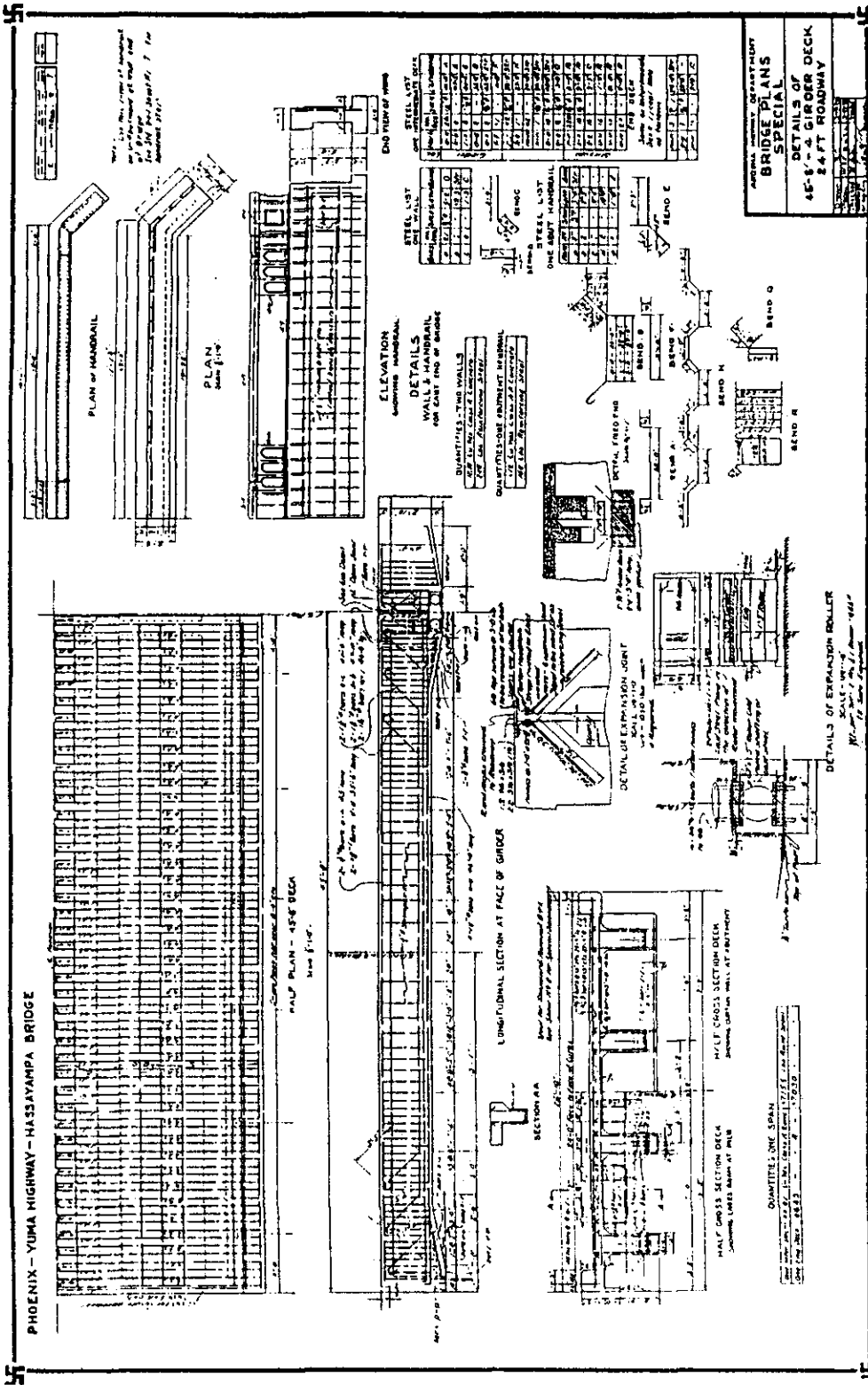


Figure 7. Details of 45'-8" x 4 Girder Deck, 24 Ft Roadway of the Hassayampa Bridge, by Arizona Highway Department, 1928

Endnotes

¹This HAER documentation draws upon the state wide inventory of highway bridges for background information. For more on bridge construction in Arizona, see: Clayton B. Fraser, "Arizona Bridge Inventory," prepared for the Arizona Department of Transportation, October 1987.

²Marshall Trimble, *Roadside History of Arizona* (Missoula, Montana: Mountain Press Publishing Company, 1986), pages 400-422.

³Byrd Howell Granger, *X Marks the Place: Historical Names of Places in Arizona* (Tucson, Arizona: Falconer Publishing Company, 1983), pages 692-93; Marshall Trimble, *Arizona: A Panoramic History of a Frontier State* (Garden City, New York: Doubleday and Company, 1977), pages 116-136.

⁴See Karen Smith, *The Magnificent Experiment: Building the Salt River Reclamation Project, 1890-1917* (Tucson, Arizona: University of Arizona Press, 1986), pages 4-5, for more on Swilling's early activities.

⁵See Donald C. Jackson, "Theodore Roosevelt Dam," HAER No. AZ-6, June 1992, for more on the early development of Arizona's Salt River Valley.

⁶Arizona State Highway Department, "History of the Arizona State Highway Department," unpublished manuscript, 1939, located at the Arizona State Library, Phoenix, Arizona.

⁷*Report of the State Engineer of the State of Arizona: July 1, 1909, to June 30, 1914* (Phoenix: Arizona State Press, 1914), page 5.

⁸Arizona State Highway Department, "History of the Arizona Highway Department."

⁹*Report of the State Engineer of the State of Arizona*, page 5.

¹⁰*Ibid.*, pages 73-74.

¹¹As quoted in Quinta Scott and Susan Croce Kelly, *Route 66: The Highway and Its People* (Norman, Oklahoma: University of Oklahoma Press, 1988), pages 30-31.

¹²Will C. Barnes, *Arizona Place Names* (Tucson, Arizona: University of Arizona Press, 1960), page 183; Byrd Howell Granger, *X Marks the Spot: Historical Names of Places in Arizona*, page 292.

¹³*Report of the State Engineer of Arizona, 1909-14*, pages 69, 94, 129; *Second Report of the State Engineer to the State Highway Commission, 1914-16* (Phoenix: The McNeil Company, 1916), pages 69, 94, 129; *Yuma Sun*, 10 April 1914, 3 June 1915, 3 September 1915, 17 September 1915, 22 October 1915, 29 October 1915.

¹⁴For more on the Yuma Bridge, see U.S. Department of the Interior, Office of Indian Affairs, "Proposed Highway Bridge over Colorado River at Yuma, Arizona," original construction drawings dated April 1914, located at the Structures Section, Arizona Department of Transportation, Phoenix, Arizona; and John W. Towle, "The Erection of the Yuma, Arizona, Bridge over the Colorado River," *Arizona Highways*, July 1926, pages 12-14.

¹⁵*Second Report of the State Engineer to the State Highway Commission*, page 395.

¹⁶*Ibid.*

¹⁷The Coldwater Bridge served to illustrate the travails of bridge building in Arizona, as reported in 1918 by State Engineer B.M. Atwood:

The location survey of the bridge site was made originally in 1915. Active construction operations began in December, 1915. During the latter part of the same month, the first in a series of unprecedented floods, extending over a period of three months, stopped all construction work and little was done until about April, 1916. The deposit of fine sands and silt several feet deep over the entire river bed, one mile wide, and the excess of water handled in all subsequent excavation, necessarily increased the unit cost in handling material and excavation for foundations. The bridge was finished and opened for traffic in December, 1916, at a completed cost for the bridge proper of \$49,107.03... During the winter of 1916-17 the excessive flood waters washed out the approach on the west end of the bridge... Another very heavy flood came during the summer rainy season. The crest of the flood over-topped the approach fill to the west of the bridge and soon raveled out the embankment. It is believed that had the fill been carried out to the same elevation as the bridge deck the approach would have resisted the action of the flood.

Early in 1917 title was acquired by the State Engineer for a right-of-way for a distance of one-half mile above the bridge. The old river bed has been cleared of timber and debris and channel excavations will be made sufficient to divert again the waters of the Agua Fria under the bridge. Under an agreement entered into with the Board of Supervisors of Maricopa County, the approach will be rebuilt to the same grade as the bridge deck and further stream protection work done above the bridge. It is believed when this work is done no further trouble will be experienced at this point so long as the channel is kept cleared of growing timber, and the grade of the approaches maintained to the elevation of the bridge floor.

Third Biennial Report of the State Engineer to the Governor and the Commission of State Institutions (Phoenix: Arizona State Press, 1918), pages 105-06.

¹⁸*Fourth Biennial Report of the State Engineer to the Governor of the State of Arizona, 1918-20* (Phoenix: Republican Print Shop, 1921), page 56.

¹⁹The *Fourth Biennial Report of the State Engineer* (page 78) stated:

The survey for a complete highway from Phoenix to Yuma has been made. In view of the floods in the winter of 1919-1920 and the desire of the Yuma Highway Commission to connect with both Phoenix and Ajo, also in realization of the necessity for a highway from the Capital of the State to Ajo, this survey was run on the south side of the Gila River from Yuma to Gila Bend, thence in a northerly direction through the area proposed to be irrigated from the Gillespie Dam, now under construction, and thence to Arlington.

²⁰Byrd Howell Granger, *X Marks the Place*, page 260.

²¹For more information on the Gillespie Dam Bridge, see "Arizona's Largest Steel Highway Bridge," *Arizona Highways*, December 1925, page 6; Gila River Bridge near Gillespie Dam, Important Link on Phoenix-Yuma Highway, Open to Traffic," *Arizona Highways*, October 1927, pages 14-15; "Seventeen Hundred Foot Bridge over the Gila near Gillespie Dam is Opened for Use," *Arizona Republican*, 1 August 1927; and "New State Bridge over Gila River," *Arizona Republican*, 2 August 1927.

²²"From Yuma to Phoenix Over Good Roads," *Arizona Highways*, April 1925, pages 11-13.

²³Ralph A. Hoffman, "Lack of Finances Held Responsible for Washing Away of Bridges in Flood Times," *Arizona Highways*, January 1927, page 10.

²⁴*Fourth Biennial Report of the State Engineer*, pages 66-67.

²⁵Ralph A. Hoffman, "Lack of Finances Held Responsible for Washing Away of Bridges in Flood Times," pages 10-11.

²⁶*Ibid.*, page 67.

²⁷Ralph A. Hoffman, "Bridge Department Designs All Structures," *Arizona Highways*, July 1931, pages 16-17.

²⁸"Arizona's Greatest Highway Program Provided for in Budget of \$5,654,487 for Construction and Betterment," *Arizona Highways*, October 1927, page 8.

²⁹"Contract Awarded," *Arizona Highways*, December 1928, page 12; see also, Proceedings of the Arizona State Highway Commission, 26 November 1928, located at the Arizona Department of Transportation, Phoenix, Arizona. The bids were each subdivided into 11 components, listed below:

Item	Quantity	Description	Bidder R.H. Martin	Strong & Grant	Levy Const. Co.	Wickes Eng.
1	100 square yards	Concrete paving	300.00	310.00	300.00	300.00
2	184 cubic yards	Borrow (inside abutments)	82.00	147.80	131.20	248.00
3	573 cubic yards	Borrow (outside abutments)	288.50	288.50	229.20	428.75
4	940 cubic yards	Excavation	5,170.00	3,780.00	5,922.00	10,340.00
5	24 cubic yards	Class 'AA' concrete	1,800.00	1,200.00	1,392.00	720.00
6	1,158 cubic yards	Class 'A' concrete	26,634.00	26,634.00	30,108.00	24,088.40
7	145,785 pounds	Reinforcing steel	8,745.90	8,017.07	7,508.00	7,288.25
8	28	Roller bridge seats	1,680.00	1,260.00	1,652.00	1,260.00
9	102 cubic yards	Remove old concrete	510.00	408.00	673.20	714.00
10		Dismantling and piling steel	500.00	800.00	800.00	400.00
11		Removing and salvaging pile trestle	100.00	200.00	275.00	100.00
Total Bid			50,389.24	47,325.48	53,668.45	50,472.84

³⁰"The Engineer's Log," *Arizona Highways*, February 1929, page 29.

³¹"County Road Plat," dated 16 October 1956, by Maricopa County Board of Supervisors, located at the Maricopa County Department of Transportation, Phoenix, Arizona.

³²File memo from W.R. Bruesch, dated 16 February 1977, located at the Structures Section, Arizona Department of Transportation, Phoenix, Arizona.

³³Ralph Hoffman, "Lack of Finances Held Responsible for Washing Away of Bridges in Flood Times," pages 10-11. This lack of funding was exacerbated by an unfriendly state legislature in the mid-1920s, as reported by Mrs. Lamar Cobb, "Arizona Highway Department," *Arizona Highways*, April 1929, pages 10-11:

Political bickering [in early 1925], resulting in a loss of public confidence, brought the financial condition of the [highway] department to a desperate pass. The bill under which the department operated at that time was drawn with the idea of tying [sic] its hands in every possible way. The legislature of 1925 failed to make adequate appropriation for carrying on the road work. In fact it was threatened that with the exception of maintenance the activity of the department would cease. The Eighth Legislature which convened in 1927 was even more hostile than its immediate predecessor and no relief was afforded the needs of the department, the result that for several months it was practically closed down. All work was stopped and a tremendous economic loss resulted. The legislature then created the present Arizona State Highway Commission, consisting of five members... It nothing else could be said on behalf of the highway commission, by removing the department from politics it relived the future heads of the department from the storm of partisan villification and abuse which had assailed those of the past.

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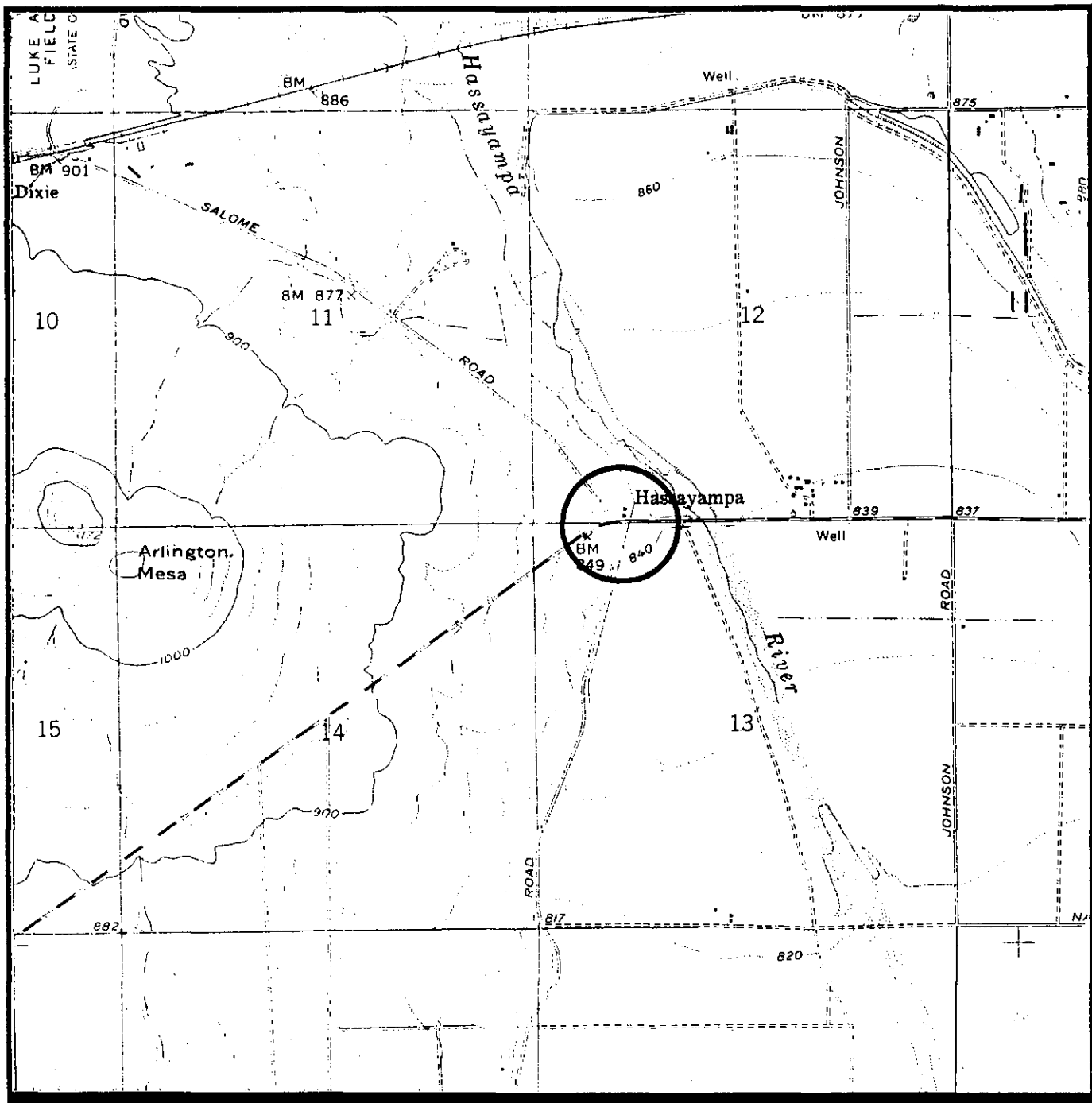


Figure 8. Location Map of Bridge (Hassayampa, Arizona, USGS Quadrangle Map: 7½ Minute Series, 1958)